

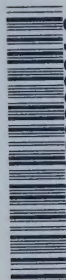
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Selected Biological Characteristics

Background Report II

Lancaster
Sound
Regional
Study

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Lancaster Sound Regional Study
Background Report No. II

SELECTED BIOLOGICAL CHARACTERISTICS OF THE
LANCASTER SOUND REGION

Co-ordinator

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Marine life

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Terrestrial Vegetation and Wildlife

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GENERAL INTRODUCTION

This report is one of five background reports prepared as part of the current study of marine and land-use options (Green Paper) for the Lancaster Sound region in the Northwest Territories. These reports are based on existing data, and together represent a body of information on which further discussion, analysis, and planning can be based. Information topics were selected on the basis of their relevancy to a particular resource use, or to provide a regional perspective of combined current or potential resource uses.

These reports and accompanying maps are being made available at this time to foster thorough discussion by interested organizations, residents of the Lancaster Sound region, and concerned members of the public. Comments arising from the public discussion and any new information will be incorporated into a final report and map set to be published later.

The study of the Lancaster Sound region is being co-ordinated by the Department of Indian Affairs and Northern Development and carried out in co-operation with the Departments of Energy, Mines and Resources, Environment, Fisheries and Oceans, Transport, and the Government of the Northwest Territories.

Copies of other background reports are available by writing to:

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Other Background Reports

Report I: Selected Physical Characteristics

Report III: Socio-Economic Characteristics
and Conservation Interests

Report IV: Non-Renewable Resources and Transport

Report V: Jurisdictions and Legislation

INTRODUCTION

One use made of the Lancaster Sound region (LSR) is the marine biological use; that is, independent of any uses by man, there are plants and animals or "biota" that use Lancaster Sound throughout parts or all of their life cycle. For the purposes of the Green Paper exercise, these biota have been subdivided into marine mammals, Polar Bears, seabirds, and fish. Direct consideration of marine plants and invertebrates is not made, primarily because of paucity of data, although they are integral parts of the Lancaster Sound ecosystem.

Marine mammals, Polar Bears, seabirds, and fish each have a role in the structure and functioning of the Lancaster Sound ecosystem. Also they have values that can be defined in terms of dollars, numbers, aesthetics, or cultural uses (see Table 1). In summary, the LSR supports significant numbers and types of birds, mammals,

and fishes; it is perhaps most important and renowned as a major breeding or summering area for colonial seabirds, Narwhals, White Whales, and Bowhead Whales.

LIFE HISTORY AND CRITICAL HABITATS

Information relating to abundance, life-history parameters, resource threats, and international protection status of marine mammals, Polar Bears, fish, and seabirds is outlined in Tables 2 to 6 and in the Green Paper maps. In summary, some of the more important items included are:

- (i) Climate and resulting ice conditions have a major influence on the production and population viability of all resource groups. Ice is a critical habitat for seals and bears; distribution and movement of whales and Walrus are limited by the distribution and extent of open water; feeding of surface-feeding seabirds (fulmars and kittiwakes) is

affected by the extent of open water as is the migration of Thick-billed Murre chicks; poor ice and climatic conditions also affect the reproduction of seabirds.

- (ii) Arctic cod appears to be very important in the Lancaster Sound food web. It is a primary prey of seals, White Whales, and Narwhals, and forms the major caloric component in the diet of chicks of fulmars, kittiwakes, murres, and guillemots and of the adults of the latter three species.
- (iii) While the coasts south of Devon and north Baffin islands are major migratory routes of White Whales and Narwhals, these species also use offshore Lancaster Sound to a significant extent. The same is true for Polar Bears, seals, and Walrus. Seabirds (except gulls, Black Guillemots, terns, etc.) are generally concentrated at 11 colonies throughout the LSR; however, their feeding areas radiate up to 200 km from their colonies. Furthermore, while certain areas, especially coastal areas, support concentrations of feeding seabirds, a high proportion of feeding seabirds are dispersed throughout much of the LSR, especially Lancaster Sound itself.

- (iv) While the fall and winter distribution of Polar Bears and Ringed Seals is not well-documented, these species are fairly well dispersed during these seasons. By late October most other marine mammals and seabirds have left the LSR. Fulmars mainly arrive by late April as do White Whales, Walruses, and Bearded Seals; other seabirds and marine mammals arrive from May to July. Consequently, other than the widely dispersed Ringed Seals and Polar Bears, there are few marine mammals and seabirds in the LSR from November to April.
- (v) A number of important areas in the LSR can be identified (see also Table 7). Four of the most noteworthy are the entire south Devon Island coast year round, especially Croker Bay to Philpots Island; north and east Somerset Island coast year round, especially Prince Leopold Island and Creswell Bay; north Baffin Island coast year round from the mouth of Admiralty Inlet east to and especially including Bylot Island; offshore Lancaster Sound and east Barrow Strait year round, but especially in the spring and summer.

THREATS

Both natural and man-made threats to the living marine resources are listed in Table 1. The most important ones are natural threats such as climate and ice; potential man-made threats such as oil spills from tankers or drilling blowouts; physical disturbances from tankers or aircraft traffic; over hunting or harvesting; and bioaccumulation of contaminants from mines, oil spills, and so on.

COMPLETENESS AND QUALITY OF DATA

Existing literature has been reviewed and summarized briefly in the preceding discussion. However, certain gaps, inadequacies, and assumptions occur in the maps and text. An assessment of this information is found in Table 8.

In summary, there is enough information on the spatial and temporal distribution and general biology of the living marine resources to permit identification of general spatial-temporal options for resource usage in the LSR. However, there are a number of deficiencies that have been identified that would be useful in selecting alternative options. Perhaps the most glaring deficiency is the inaccessibility to the 1978 and 1979 Petro

Canada data for Baffin Bay. In addition, there appear to be a number of uncertainties associated with the effects of oil on various marine organisms. Another major deficiency is the lack of integrated ecological data on trophic relationships, quantitative habitat classifications, and the relationship among climate, ice, oceanography, and biology of key marine mammals. In short, Lancaster Sound as an ecosystem is poorly understood, especially the role of Arctic cod.

Table 1
Marine Life: Their Importance Plus Data on Threats and International Status

Marine Biological Group	Importance	Threats		International Protection Status and Action
		Natural	Man-made/Potential	
Marine Mammals	- resource essential to Inuit culture - worth \$1.3 million annually - Bowhead are endangered species - 33% of North American White Whales and 85% of world's Narwhals use LSR	- changing ice conditions	- overhunting - false leads - oil spills	- International Whaling Convention (bowhead)
Polar Bears	- Top trophic level predator - considered vulnerable: list II under US Endangered Species Act - harvested by Inuit (\$50 000-250 000 annually)	- disease present but importance unknown - variable ice and snow conditions influence distribution and reproduction but mechanisms not understood	- disturbance near dens - overhunting - disturbances of polynyi where seals and bears concentrate - accumulation of metals and oil in tissue - effects of oil on bears' ability to thermo-regulate	- International Agreement on Conservation of Polar Bears and their habitat - there is some movement of bears between Greenland and LSR
Fish	- Arctic cod appear to be a centre of food web and are important food sources for seals, seabirds, Toothed Whales and char - Arctic char are used by Inuit (\$100 000)	- changes in physical or chemical oceanography - blockage of rivers (char)	- toxic effects of oil and dispersants on fish and their prey, especially subice biota - uptake and bioaccumulation of metals and oil lead to taste, odour problems	- None

Table 1 (continued)

Marine Biological Group	Importance	Threats		International Protection Status and Action
		Natural	Man-made/Potential	
Seabirds	- of a total of 8.3 million breeding seabirds comprising the main colonial species in E Canada, 6 million breed in the E Canadian Arctic; about 50% of arctic birds occur in LSR; each of the four primary colonial species are confined to five or less major colonies in LSR making them vulnerable to threats; the status of fulmars, kittiwakes, and guillemots is uncertain; Thick-billed Murres appear to have undergone 20-50% reduction in population since 1950s	- variable ice and weather conditions from April to September	- oil spills - bioaccumulation of metals and oil - disturbance at breeding colonies - hunting - changing fortunes of prey - drowning in fish nets	- Migratory Birds Convention Act; most of the drownings in fish nets occur off W Greenland; seabirds comprise a portion of the Greenland Inuit diet. Thick-billed Murres are considered by several international organizations as being a threatened species requiring special protection

Table 2
Marine Mammals: Abundance and Life-History Data

Species	Abundance in LSR	Feeding Grounds	Dietary Preferences	Mating Area	Pupping-Nursery Area	Hauling-out Grounds
Harp Seal	16 000 migrated west past Bylot in 1976 vs. 132 000 in 1957		Arctic cod, capelin, planktonic and benthic crustaceans (immature seals)	Newfoundland and Gulf of St. Lawrence	Newfoundland and Gulf of St. Lawrence	pack/shore ice throughout LSR
Bowhead Whale	est. 500 (maximum of 50 seen in any one year)	entire LSR area	benthic inverts; zooplankton	?	entire LSR area	NA
White Whale	10 000-13 000	there are likely many of these but Cunningham Inlet is one known area	Arctic cod, other fish and marine inverts	?	apparently warm water estuaries e.g. Creswell Bay and?	NA
Walrus	1 000	near hauling-out grounds	benthic inverts (15-80 m)	April to May in migration	mid-May in migration	Dundas Harbour, Philpots Is., Wollaston Is., Brooman Pt.
Narwhal	20 000-30 000 (likely closer to 20 000)	appear to feed along migratory routes rather than in summering areas e.g. south Devon, Lancaster Sound, Admiralty Inlet, Eclipse-Pond-Navy Board	squid, shrimp, Arctic cod, halibut	?	Eclipse Sound, NA Admiralty Inlet	NA
Bearded Seal	75 000-185 000 in Arctic	usually within 200 m depth contour	benthic and pelagic inverts, Arctic cod; molluscs are primary food	ice floes	born on ice floes in late April	ice floes
Ringed Seal	? (at least 100 000)	throughout LSR	opportunistic - Arctic cod, crustaceans	throughout LSR	throughout LSR; one known pupping area is SE coast of Cornwallis; one known moulting area is Aston Bay	throughout LSR; moulting area in Aston Bay

Table 3
Marine Mammals: Migration and Distribution Data

Species	Inward Spring Migration		Summering Area	Outward Fall Migration		Wintering Area
	Time	Route		Time	Route	
Harp Seal	May-June	Newfoundland and Gulf to Lancaster to Barrow Strait to Russel Island, Baillie Hamilton, central Peel Sound, Prince Regent Inlet	July, Aug. along limits of pack ice; Navy Board Inlet, Barrow Strait, Prince Regent Inlet, Peel Sound (immature off West Greenland)	September	to Lancaster to Baffin Bay to Davis Strait	Newfoundland, Gulf of St. Lawrence
Bowhead Whale	?	Frequent sightings along north shore of Bylot Island (Cape Hay) during period of spring migration (July)	July, Aug. Lancaster Sound, Pond Inlet, Eclipse, Navy Board, Admiralty, Barrow, Prince Regent, Creswell, Wellington, Peel	September	south coast Lancaster to Baffin coast	south of LSR
White Whale	Apr.-July July-Aug.	80-90% along south Devon, rest throughout sound and along north Bylot, north water and Disko Is. south to Devon, to Somerset Is., to Creswell, Peel, Prince Regent, Barrow	Aug. Creswell Bay, Cunningham and ? very few in Lancaster Sound	September-October (in 3-4 wks)	south Devon to Cunningham Mtn north to Jones Sound to Greenland	north water (500-1 000) Disko Is. (10 000-12 000)
Walrus	begins in late April, peaks in June-July	to south Devon to Crozier, Wellington Channel, Prince Regent Inlet	Lancaster Sound - south Devon (65%), N Baffin (Cape Crauford, Cape Charles Yorke, Maud Bight), Peel, McDougall Sound, Queen's Channel, Wellington	October	? few seen after end of July	polynyi-Penny Strait, Queen's Channel and Dundas Harbour?
Narwhal	June-July	30% to Bylot Is. to Pond, Eclipse, Milne, Navy Board; 50% to south Devon 20% to Lancaster Sound; by late July most along north Baffin coast	in Aug. along the limits of pack ice, very few are in Lancaster Sound; most are in Admiralty and Prince Regent? Pond, Navy Board, Eclipse	late Sept.; gone by October	along south Devon, north Baffin and offshore moving east	off SE, edge pack ice in Davis St. -off Disko Is. (Greenland)
Bearded Seal	March-June	from Baffin Bay?	eastern Lancaster Sound from south Devon to Borden-Bylot islands	September; gone by October	move onshore south Devon and north Baffin	Baffin Bay?

Table 4
Abundance and Life-History Data for Polar Bear and Fish

Species	Abundance	Feeding Grounds	Dietary Preference	Mating, Spawning, Denning	Migration
Polar Bear	estimate 1 000-1 700 in LSR	-almost exclusively on floes/pack ice near landfast ice along coastlines and across mouths of bays and floe edges -offshore distri- bution and habitat preferences not known -highest rate of feeding is pro- bably during spring and early summer -in winter and early spring hunting is con- centrated on subnivean lairs and breathing holes	-predominantly Ringed Seal, especially young of the year (80% by number in the spring)	-mating occurs on sea ice in April-May -maternity denning occurs within 8 km of coast on land on north Somerset and south Devon from mid- November to early April	-bears are facultative mi- grants as they are year- round residents of LSR and active throughout the year (except denning females and cubs); as ice melts and disappears in summer, bears are found in deep bays and fiords where fast ice persists and seals con- centrate - south Devon especially Croker, Maxwell, and Radstock Bays; after ice disap- pears in mid-August some females and juvenile bears remain on land in summer retreats (SW Devon, N Brodeur and Borden, Bylot, NE Baffin, SE Devon, N Somerset and W Brodeur). Some bears occur in off- shore pack ice, coast- lines and inland during this period, but propor- tions are unknown. Little is known about their distribution in the fall when they occupy newly formed ice.
Arctic Char	-unknown except 500 000 in Robertson River, -100 000 Salmon River and 100 000+ Union River	-in the sea from May-Oct. -usually feed in or near estuary	-Arctic cod, crustaceans (especially amphipoda) in the sea	-spawn in late Aug.- early Nov. in fresh water -juveniles reared in fresh water for 2-8 years	-migrate into fresh water from August-October and overwinter there to leave in May to July for the sea
Arctic Cod	abundant in LSR estimated at 400 000 metric tonnes	-? (if they even exist as such)	-seasonal: phytoplankton copepods, amphipods, shrimp, fish, eggs, fry	-spawns in Jan.-Feb. but not known where -young are pelagic and then become benthic	-late summer and fall approach shores (0-4°C) -spawns in January and February -overwintering? (thought to be under ice)

Table 5
Seabirds: Abundance and Food Preference Data

Colony	Abundance of species of seabirds ^{1,2} with significant numbers: 1 000 breeding pair/colony.				Dietary Importance of Various Food Groups ³				
	NF	BLK	TBM	BG	Species	During Chick-Rearing Period			Other than During Chick-Rearing Period
						primary food	secondary	tertiary	
Washington Point		± 3 K			NF	Arctic cod	pelagic amphipods	peteropods	- omnivorous but primarily pelagic crustaceans and then fish
Browne Island		± 1 K							
Skrus Point				10 K					
Cape Liddon	5 K								
Habhouse Inlet	10-35 K								
Cambridge Point	?	1-10 K	±200 K		BLK	Arctic cod	nil	nil	- fish and to a lesser extent pelagic crustaceans
Princess Charlotte Monument	?	1-10 K							
Prince Leopold Island	30 K	29 K	86 K	2 K+	TBM	Arctic cod	amphipods	nil	- fish and crustacea are both important although fish likely predominate
Baillarge Bay	25 K								
Wollaston Island		.1-1 K							
West of Cape Hay		50 K	400 K						
near Cape Graham									
Moore		3 K	± 20 K		BG	Arctic cod	nearshore amphipods	nil	- considerable seasonal variation between fish and crustaceans (benthic and pelagic)
1	NF: Northern Fulmar (<u>Fulmarus glacialis</u>) BLK: Black-legged Kittiwake (<u>Rissa tridactyla</u>) TBM: Thick-billed Murre (<u>Uria lomvia</u>) BG: Black Guillemot (<u>Cepphus grylle</u>)								
2	Other seabirds with colonies of less than 1 000 breeding pairs that also occur in LSR include Glaucous Gull (<u>Larus hyperboreus</u>) and Thayer's Gull (<u>Larus thayeri</u>). Primarily because of their more opportunistic feeding and breeding site requirements these birds are more widely dispersed along the coasts of the LSR. Dovekies (<u>Plautus alle</u>) do not breed in LSR but do feed there; the same can be said for Ivory Gulls (<u>Pagophila eburnea</u>). Table excludes terns, jaegers, etc.				Dovekie	pelagic amphipods	Arctic cod	nil	- crustaceans (mostly planktonic) and secondarily fish
³ Dietary importance as defined in terms of energy (i.e. calories) input									
⁴ Chick-rearing periods: (from hatching to fledging)									
						NF : late July-late Sept. BLK: mid July-early Oct. TBM: late July-early Sept. BG : late July-early Sept.			

Table 6
Phenology and Habitat Requirements of Northern Fulmar (NF), Black-legged Kittiwake (BLK), Thick-billed Murre (TBM), and Black Guillemot (BG)

Event/Habitat Requirement	NF	BLK	TBM	BG
Spring Influx	Major colonial species arrive at eastern entrance to LSR in late April and thereafter. Ice conditions determine timing of penetration into LSR. For up to a month they move to and fro between colony and feeding area.			
Summer Reproductive Phenology	Smaller proportion of population breeds if there are bad ice or climatic conditions. Breeding delayed up to 3 weeks in bad ice or climatic conditions.			
Egg laying	- early to mid-June	- mid-June to mid-July	- late June to mid-July	- late June to mid-July
Incubation	- early June to early August	- mid-June to mid-Aug.	- late June to late Aug.	- late June to mid-Aug.
Hatching	- late July to early August	- mid-July to mid-Aug.	- late July to late Aug.	- late July to mid-Aug.
Fledging	- September	- mid-Aug. to early Oct.	- early Aug. to early Sept.	- mid-Aug. to mid-Sept.
Presence at Colonies	- late April to Oct.	- May to mid-Oct.	- May to late Sept.	- May to late September
Fall Exodus	- most leave by mid-Sept. - a few remain in Oct.	- still present in reduced numbers in late Sept.	- fledgling chicks and accompanying adult swim (walk) out of LSR in late Aug. and early Aug. and early Sept.	- disperse during Sept.
Wintering	- pelagic, off continental shelf in N Atlantic	- N Atlantic	- W Greenland (25%) - Newfoundland (75%)	- N Atlantic off Greenland
Breeding Habitat	_____ Cliffs with ledges and with suitable feeding grounds within foraging range _____			
Feeding Habitat	Birds are concentrated on localized food sources, e.g. along ice edges, along mouths of bays where there are edges of landfast ice or fresh-water entering the sea, or where glaciers enter the sea Feed at surface by seizing, dipping, or filtering _____ Feed under water by pursuing prey _____			
	- potential foraging range up to 200 km	- potential foraging range up to 96 km, average 48 km	- potential foraging range up to about 112 km	- potential foraging range up to about 55 km

Note: While they do not breed in the LSR, Dovekies do occur in large numbers (1.6-6 million) at the entrance of Lancaster Sound in the second half of May for feeding and in smaller numbers in the fall. Their summer colonies are located in NW Greenland and they winter in the North Atlantic from Greenland to the Grand Banks of Newfoundland. Davis Strait and Baffin Bay are along their migration route.

Table 7

Seasonal¹ Importance of the Various Geographical Areas of the LSR to the Living Marine Life⁴

Geographical Area	Polar Bear				Marine Mammals				Sea Birds				Resource Group Seasonal Totals			
	W ²	S	S	F ³	W	S	S	F	W	S	S	F	W	S	S	F
Cornwallis Island	X	X							X	X	X		1	2	1	1
Somerset Island																
-north coast	X	X	X?	⁵				X	X	X	X		1	2	3	1
-Creswell Bay and east coast	X	X	X					X	X	X	X		1	2	3	1
-south coast (including Bellot St.)		X	X					X					0	1	2	0
Devon Island (entire north coast)	X		X						X	X	X		1	1	2	1
-only southeast (Croker-Cape Sherard) coast	X	X	X				X	X	X	X	X		1	3	3	2
-entire south (Beechey-Cape Sherard) coast	X	X	X				X	X	X	X	X		1	3	3	2
-only southwest (Beechey-Maxwell Bay) coast	X	X	X				X	X	X	X	X		1	3	3	2
-Philpots Island		X	X?				X	X	X	X	X		0	3	3	2
Baffin Island																
-Brodeur -north coast	X?	X	X					X	X	X	X		1	2	2	1
-west coast	X?	X	X?					X	X	X	X		1	2	2	1
-east coast			X					X	X	X	X		0	1	3	1
-Borden -north coast	X?	X	X				X	X	X	X	X		1	2	2	2
Bylot Is. -north coast	X	X	X				X	X	X	X	X		1	3	3	2
-south coast	X?		X					X	X	X	X		1	3	3	1
-west coast	X?		X					X	X	X	X		1	1	3	1
Cobourg Island													0	1	1	1
Navy Board-Eclipse-Pond inlets				NB ⁶				X	X	X	X		0	1	3	1
Lancaster Sound offshore	X	X					X	X	X	X	X		1	3	2	2
Admiral Inlet		X	X					X	X	X	X		0	2	3	2
Prince Regent Inlet		X					X	X	X	X	X		0	3	2	1
Peel Inlet							X	X					0	1	1	0
Wellington Channel		X						X	X	X			0	1	2	1
Barrow Strait		X					X	X	X	X	X		0	3	2	1
McDougall-Queen's Sound		X					X	X	X	X			0	2	2	1

¹Seasonal: winter (W): 1 Nov.-15 Mar.; spring (S): 16 Mar.-15 June; summer (S): 16 June-15 Aug.; fall (F): 16 Aug.-31 Oct.²Known and probable denning areas only; excludes distribution of bears in winter as little is known.³Little is known about fall distribution for Polar Bears.⁴Fish are omitted as little is known about their seasonal marine distribution.⁵X?: probable.⁶Navy Board Inlet.

Table 8

Marine Life: An Assessment of the Completeness and Quality of Data and Identification of Needs for Additional Study

Marine Biological Group	Completeness and Quality of Data		Relationship with Other Subject Areas
	Degree of Confidence as Mapped	Information Deficiencies	
Marine Mammals	- acceptable	- location and function of summering areas of White Whale, Narwhal; migration routes of whales in western LSR; fall migration routes of Walrus throughout LSR; biology of most species especially Bowhead Whale; effects of oil; population dynamics and effects of removal of sub-populations; effects of false leads; lack access to Petro Canada 1978 and 1979 data for Baffin Bay; sub-lethal effects of metal contaminants	- ice, currents, Arctic cod, plankton
Polar Bears	- acceptable	- eastern distribution limits of sub-population; fall and winter distribution; inadequate understanding of bear-seal population dynamics, ecological interrelationships; lack of baseline levels of contaminants in tissue; denning areas on SE Devon; effects of oil; access to Petro Canada 1978 and 1979 data on Baffin Bay and NE Baffin Island; establish definitive values on reproductive parameters, age structure, and abundance to define a baseline against which post-impact effects may be quantitatively assessed	- ice, climate, currents, marine mammals, Arctic cod, harvesting by man
Seabirds	- acceptable	- year-to-year variability data on populations; foraging habits especially in spring and fall; ecological relationships with Arctic cod and crustaceans; access to Petro Canada 1978 and 1979 on Baffin Bay and NE Baffin Island; climatic influences on food sources	- fish, invertebrates, ice, currents, climate

Table 8 (continued)

Marine Biological Group	Completeness and Quality of Data		Relationship with Other Subject Areas
	Degree of Confidence as Mapped	Information Deficiencies	
Fish	- acceptable for char, not other species, especially cod	- bioaccumulation of contaminants; effects of oil and sub-ice biota; biology and population dynamics of Arctic cod, sculpins; biology of char in salt water; ecological relationships between cod and aquatic invertebrates, seal, seabirds; effects of ice and climate on cod populations and distribution	fish are major food source for seabirds, marine mammals, climate, ice

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Terrestrial Vegetation and Wildlife

by J.T. Inglis

INTRODUCTION

Information on the distribution, abundance, and movements of the major terrestrial herbivores in the Lancaster Sound region is fragmentary. Where government and industry surveys have been conducted they have been carried out only in the March-July period, which is less than one half of the year. Information obtained during the Inuit Land Use and Occupancy Project is five or more years old and is in need of updating and verification. In the past caribou and muskoxen have been heavily hunted throughout the area and they have not regained their former numbers or distribution. The status of terrestrial wildlife populations in the area is uncertain, particularly during winter, and it is likely that, if protected, these populations could occupy a much greater part of the study area. For these reasons particular attention should be paid to the extent of potential habitat of these species. To this end, a vegetation map (Preliminary Data

Atlas: Map 2.14) of the project area has been compiled by S.A. Edlund to provide a first impression of where important caribou, muskoxen and snow goose habitat is to be found. Such a map is also useful in reconciling the various approximations of wildlife distribution; for example, on Somerset Island, maps have been obtained from a variety of sources.

TERRESTRIAL VEGETATION

Regional Vegetation Map

The regional vegetation map (Map 2. 14) for the project area is based on interpretation of "false colour" Landsat imagery. MSS bands 4-5-7 and 5-6-7 reveal patterns that correspond to reflectance levels characteristic of a variety of vegetation types and of poorly vegetated or unvegetated surficial materials. The nature of the vegetation making up the observed patterns can be deduced from field observation in the area, and from published and unpublished reports,

surveys, and studies. Prior to this project, detailed mapping had been completed for only a small part of the study area. The only comprehensive vegetation map available was the one prepared by Edlund for Cornwallis Island (Barnett et al., 1977). A map of caribou summer and winter range on Somerset Island had been prepared by Russell et al. (1978), based on extensive field studies. Polar Gas Ltd. commissioned a landscape survey of a 30 km wide corridor, which crosses from Bathurst Island to Cornwallis Island, then south across Barrow Strait and western Somerset Island. Types of vegetation communities were mapped along this corridor by R.M. Hardy and Associates Ltd. (1977). In addition a number of local botanical investigations had been carried out in the area. These are listed in the reference section.

As soils are poorly developed, or absent, in the area, the distribution, abundance, and characteristics of the vegetation can be directly related to the nature of surficial materials present. With a knowledge of the lithology, chemistry, texture of Quaternary materials, and moisture-retention characteristics, a more reliable map can be produced. It is then possible, for example, to distinguish between

dark, unvegetated carbonate bedrock and lichen-covered granite or quartzite.

Surficial materials in the project area, and their associated vegetation, can be characterized as bedrock or Quaternary deposits.

A. Bedrock

- (i) carbonates and gypsum, usually devoid of vegetation;
- (ii) granite, gneiss, sandstone, and siltstone, supporting lichen communities on outcrops and on coarse, weathered rubble;
- (iii) unconsolidated sandstone and shale in which vascular plants root directly.

B. Quaternary Deposits

These consist of alluvium, marine, and lacustrine silt and clay, tills and glaciofluvial deposits. These support some of the densest plant communities on the islands.

While the bedrock lithology of the area has been described, the nature of overlying Quaternary materials, such as their carbonate content, on northern Baffin Island and parts

Devon Island is unknown.

Vegetation Types

The types of vegetation are very broadly defined for in well-vegetated areas only vegetation units larger than about 1 km² can be distinguished, while in sparsely vegetated areas, units of 5 km² are a minimum for classification. The principal types are dwarf shrub communities, sedge and grass communities, dwarf shrubs and meadow complex, purple saxifrage communities, and lichen communities.

There are two characteristic dwarf shrub communities: dense areas with 60 percent cover; and sparse areas, typically with 20 percent cover. Dryas and Salix are the most common species in both areas, together with Saxifraga oppositifolia, grasses, and sedges.

Two types of sedge and grass communities are recognized. The first is dense (60 percent cover) sedge and grass meadows and wet meadows with thick bryophytic mats. Carex eriophorum, Alopecurus, and Dupontia are common genera. The second type is grass barrens with only 20 percent cover, dominated by Alopecurus, Puccinellia, Poa, and Phippsia.

The dwarf shrub-meadow complex has features of both the former two.

The purple saxifrage communities are represented by two characteristic communities: one with dense cover of 60 percent; and the other with sparse cover of 20 percent. The former has Saxifraga oppositifolia associated with Salix, grasses and sedges, and a cryptogram understory. The latter is composed of Saxifraga oppositifolia barrens.

The lichen communities are subdivided into lichen-covered granite, gneiss, sandstone, and quartzite bedrock and weathered rubble; and lichen-covered bedrock with pockets of dwarf shrub tundra.

TERRESTRIAL WILDLIFE

Arctic Fox

Arctic foxes, Alopex lagopus, are of major economic importance to Inuit hunters and trappers. The principal sources of information on the Arctic fox are the reports and unpublished ecological maps of the Inuit Land Use and Occupancy Project (Riewe, 1976; Brody, 1976; Freeman, 1976). Tener (1961) recorded the location of fox dens and foxes on Cornwallis Island and part of Devon Island.

Riewe (1976) states that: "Arctic foxes are common throughout the Resolute region whenever the fox population is high. The Inuit report that foxes den and give birth to their pups in June on the grassy areas of Cornwallis Island near Lake Eleanor, Intrepid and Midshipman Bays...." He notes that in winter foxes disperse and scavenge on the sea ice. The Inuit travel and trap foxes around the coastline, but make few trips inland. As a result, knowledge about fox denning sites is restricted to coastal areas, which is reflected in the Regional Ecology Maps. Riewe writes that around Grise Fiord "The Arctic fox population fluctuates greatly from year to year, but even during years of low population hunters have found fox tracks just about anywhere on land or on the sea ice." This statement could apply throughout the coastal regions of the study area.

Of particular interest on the Resolute Bay Ecology Maps is the description of a general movement of foxes in winter from Prince of Wales Island to Griffith and Cornwallis islands, across Barrow Strait.

Barren Ground Caribou

The barren-ground caribou rangifer tarandus groenlandicus on Baffin Island is of major significance to Inuit culture and economy. barren-ground caribou have been absent from northern Baffin Island for at least 20 years and are apparently now returning to the area. Barren ground caribou are listed as an endangered species in the NWT.

There appears to have been no systematic surveys for barren-ground caribou on northern Baffin Island (Clement, 1978). Rippin (1972) summarized the available information on distribution and numbers and reported on limited surveys in the vicinity of Pond Inlet and Arctic Bay. He reported that caribou are scarce or non-existent on both Brodeur and Borden peninsulas and are found scattered throughout the area south of Oliver Sound, with most occurring south of the study area between Milne Sound and Paquet Bay. Few have been sighted by field parties from the Geological Survey of Canada working in the area. According to Inuit Land Use and

Occupancy Project reports: "Bylot Island and the land southwest of Low Point...has had no caribou during Period III (1959-1974) because the herds disappeared before 1959. ...hunters say that they will soon be hunting caribou on Bylot Island again, for tracks were seen there during early spring 1974" (Brody, 1976, p. 160). Unpublished Regional Ecological Maps (scale 1:1M) indicate that caribou are re-establishing themselves in the Mala River area of Borden Peninsula, south of Pond Inlet, and the coastal lowlands of Bylot Island. These observations have not been verified. Calef (1978) writes that: "on north Baffin, even calving grounds are unknown and it is not certain whether north Baffin caribou are a separate herd from those on south Baffin."

Muskoxen

Muskoxen, Ovibos moschatus, are one of the three major herbivores in the study area, the others being Peary caribou and the snow goose. They have been protected in Canada since 1917 although quotas have been set since 1969 by the NWT government, for the benefit of Grise Fiord residents.

Devon Island

Between 200 and 300 muskoxen range on the lowlands of northeastern Devon Island (Freeman, 1971; Hubert 1977; Riewe 1977) but are not numerous on those parts of the island in the study area. No systematic wildlife surveys have been conducted on southern Devon Island but 10 to 15 muskoxen are known to frequent the Croker Bay area and a few may be found in the Erebus Bay-Radstock Bay area and adjacent lowlands. Muskoxen may occasionally range as far east as Philpots Island although they have not been recorded there.

Somerset Island

Thought to be absent from Somerset Island for many years, a herd of 12 muskoxen has been seen in the Stanwell-Fletcher Lake area in 1975 and 1976 (Russell, Edmonds, and Roland, 1978). Riewe (1976) notes that Resolute Bay hunters know of muskoxen on the island but gives no details. Muskoxen are thought to migrate across Peel Sound from the relatively well-populated Prince of Wales Island but the timing, location, and extent of this movement

has not been documented. Russell et al. (1978) concluded that the Creswell River lowlands, Stanwell-Fletcher Basin, and sections of the coast between Aston Bay and Bellot Strait were suitable muskoxen habitats. Resolute Bay hunters have delimited muskoxen territory in the northwest of the island.

Cornwallis and Little Cornwallis Islands

Cornwallis Island supports a small population of muskoxen. Tener (1957) estimated that there were between 3 and 30 on the island between 1952 and 1957 and about 50 in 1961. Similar numbers are suggested by Fischer and Duncan (1976) following surveys in May and July 1974 and April and June 1975. Herds are found principally in the west and northwest of the island and in the vicinity of Eleanor Lake. These observations agree with Resolute Bay hunters' descriptions of muskoxen territory.

No muskoxen were seen by Tener (1961) on Little Cornwallis Island but, subsequently, Miller and Russell (1976) estimated a population of 40 in April 1973, 20 in March 1974, and 12 in August 1974. Muskoxen are thought to move to and from

Bathurst, Little Cornwallis, and Cornwallis islands but the timing, extent, and location of these movements are not known.

Baffin Island

There are no muskoxen on Baffin Island nor any record of their presence "within historical times" (Tener, 1965).

Peary Caribou

The Peary caribou, rangifer tarandus peary, is one of the three major herbivores in the study area. It is of major significance to Inuit culture and economy. Peary Caribou populations have undergone a major decline in the Parry Islands since 1961 and particularly since 1973 (Miller, Russell, and Gunn, 1977).

Devon Island

Once numerous in the Jones Sound area, Peary caribou are now rare throughout Devon Island and adjacent southern Ellesmere Island. Small bands and solitary animals are seen from time to time, the majority of sightings being on Grinnell Peninsula to the north of the study area. Tener (1961) estimated that there were no more than 300

caribou on the island in 1961, while Riewe (1976) estimated that there were fewer than 250 caribou in the entire Jones Sound region in 1973, an area covering southern Ellesmere Island and Devon Island north of 74°. Very few Peary caribou have been sighted on the south coast of the island, but there have been no systematic surveys.

Somerset Island

The only systematic surveys of Somerset Island have been those of Fischer and Duncan (1976) on behalf of Polar Gas. Surveys were conducted in June 1974 and March and June 1975 with estimates of numbers ranging from 245 in the first survey, to 903 in the last. Most caribou were found north of Stanwell-Fletcher Lake on the west coast of the island in March to early June and south of Stanwell-Fletcher Lake in late June of 1975. Based on these surveys the authors concluded that the coast of Somerset Island may be an important wintering area for caribou and that the concentrations of cow-calf pairs during early summer south of Stanwell-Fletcher Lake suggests that this may be a calving area. Russell, Edmonds, and Roland (1978) have mapped summer and

winter ranges of Somerset Island, based on habitat studies in 1975 and 1976, and are in general agreement with Fischer and Duncan. In addition, Russell et al. show Creswell River Basin as a caribou summer range.

An understanding of the seasonal distribution and abundance of caribou on Somerset Island is made more difficult by the fact that Peary caribou move among the islands, particularly between Somerset and Prince of Wales islands. Miller and Gunn (1978) reported that 304 trails, made by at least 781 individuals, were found on the sea ice of Peel Sound between 72° 30' N and 73° 30' N, representing about 75 percent of all trails and tracks of caribou seen on the ice south of Viscount Melville Sound and Barrow Strait. It is thought that caribou spend at least part of their winter on Somerset Island and Boothia Peninsula and move to Prince of Wales Island for the summer. There is limited evidence of autumn-winter movements of caribou to Somerset Island however.

These limited scientific surveys complement information on seasonal distribution and movements of caribou compiled

during the Inuit Land Use and Occupancy Project. The principal sources of information are the unpublished Regional Ecological Maps for Arctic Bay-Pond Inlet, and the Settlement Ecological Maps for Resolute Bay. The latter of the two sets is more detailed.

The Inuit recognize two discrete populations of Peary caribou on Somerset Island. The Arctic Bay-Pond Inlet maps indicate summer and winter-spring core areas for Somerset Island caribou and show the wintering areas of Prince of Wales caribou on the west coast of Somerset. Resolute Bay hunters suggest broader summer and winter ranges and provide details of migrations between them. A breeding area is identified on the southwest coast of the island. Resolute Bay hunters also note an emigration of caribou towards Spence Bay over the five- year period prior to the study, in addition to seasonal movements across Peel Sound.

Cornwallis and Little Cornwallis Islands

The Resolute Bay Ecological Maps indicate the movement of caribou from Bathurst Island to Little Cornwallis Island across Crozier Strait and spring and spring-fall movements across

McDougall Sound between Bathurst and western Cornwallis Island.

The map also indicates an extraordinary emigration of caribou from southern Bathurst to Prince of Wales Island via Cornwallis, Griffith, and Lowther islands. The Inuit attribute this to disturbances caused by oil exploration work in 1973-1974. A summer feeding area is identified in the north and a winter feeding area in the west central area of the island, with spring and fall migrations between these contiguous ranges. Tener (1961) estimated the caribou population on Cornwallis Island to total 43. Numbers reported have varied considerably since 1961, presumably reflecting movement among islands and the thoroughness of the surveys. It appears that the population is small and ranges principally in the northwest of the island. Fischer and Duncan (1976) conducted four complete surveys during 1974 and 1975; 13-14 May and 28 July 1974; 16 April and 20 June 1975; their estimates ranged from zero to 52 animals. Miller, Russell, and Gunn (1977) estimated that there were 8 caribou on Little Cornwallis Island in 1973 and 12 in 1974, based on their surveys of the island.

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